Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

July 28, 2014

To: FWP Region 3 EA Standard Distribution List

Ladies and Gentlemen:

The enclosed Environmental Assessment (EA) addresses the proposed Eurasian Watermilfoil herbicide treatment project in the West Canal of the Canyon Ferry Wildlife Management Area near Townsend, MT.

This Draft EA may be obtained from FWP at the address provided above or viewed on FWP's Internet website: http://www.fwp.mt.gov .

Montana Fish, Wildlife & Parks invites you to comment on the attached proposal. The public comment period will be accepted until 5:00 p.m., August 27, 2014. Comments should be sent to the following:

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Or e-mailed to: cmclane@mt.gov

Sincerely,

Patrick J. Flowers
Region Three Supervisor

Montana Fish, Wildlife & Parks

Environmental Assessment

Control of Eurasian Watermilfoil (*Myriophyllum spicatum*)

within

Canyon Ferry Wildlife Management Area, Broadwater County, Montana

July 2014

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1 INTRODUCTION

1.1 Background

Eurasian watermilfoil (*Myriophyllum spicatum*) was first discovered in Montana in 2007 in Noxon Rapids Reservoir. In 2010, several new infestations of Eurasian watermilfoil (EWM) were identified throughout the state including Fort Peck Reservoir, Toston Reservoir, Jefferson River, upper Missouri River, and Canyon Ferry Wildlife Management Area.

Eurasian watermilfoil is an invasive aquatic plant that is non-native to the U.S. It is listed on the Montana Noxious Weed List as a priority 2B species, and as such, landowners have the responsibility to control said species on their property. Eurasian watermilfoil and other aquatic invasive plants can pose an environmental and economic risk to Montana. Eurasian watermilfoil control efforts in Noxon Rapids Reservoir have exceeded $1 million dollars to date. Early detection and control are vital to control or eradicate EWM.

1.2 Project Location

Canyon Ferry Wildlife Management Area (WMA) is located in Broadwater County, just north of the town of Townsend. The majority of the WMA is owned by the Bureau of Reclamation but is managed by Montana Department of Fish, Wildlife, and Parks (MDFWP). Canyon Ferry WMA is 5,100 acres and is adjacent to the south end of Canyon Ferry Reservoir. The management area contains a river delta of the Missouri River at the inlet to the reservoir. The area is a typical river delta with many braided channels and backwaters of the Missouri River that provide many suitable areas for the establishment of EWM.

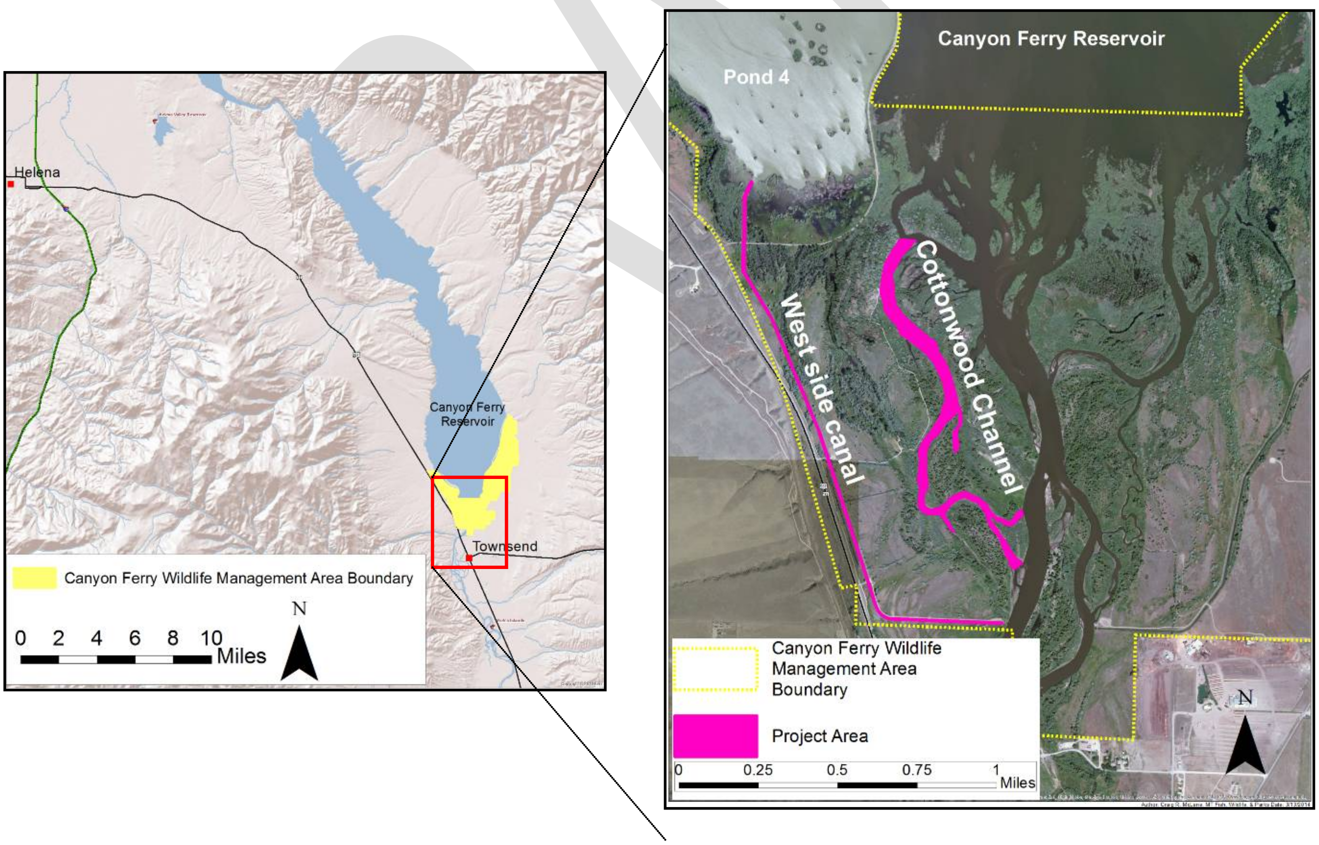

Figure 1. Figures show a) location of Canyon Ferry WMA in Broadwater County, MT, and b) project areas within Canyon Ferry WMA highlighted in pink.

1.3 Previous Eurasian Watermilfoil Control Efforts

Since the confirmation of EWM in Canyon Ferry WMA in 2010, management area staff and volunteers have worked to suppress known infestations. Efforts have included annual hand-pulls with previous efforts in Cottonwood Channel including removal of 640 pounds of EWM in 2011 (105 worker hours) and 42 pounds of EWM in 2012 (28 worker hours). Hand removal projects in this channel appear to be effective for EWM suppression, and the plan is to continue these pulls into the future.

In 2013, MDFWP worked with Montana Conservation Corps (MCC) members to hand-pull EWM within the West Canal. The canal is 1.7 miles long with steady width and grade. The crew consisting of MCC, MDFWP, Bureau of Reclamation staff, and other volunteers spent 5 days and removed 7,175 pounds of EWM (over 400 worker hours) while only covering .93 miles. Manual removal is not a viable option to suppress EWM in this canal.

2 PURPOSE AND NEED

2.1 Proposed Action

The purpose of the proposed project is to control the spread of EWM within Canyon Ferry WMA and to prevent it from spreading into downstream areas of the Missouri River system and to other areas where recreationists inadvertently carry the invasive plant species. This environmental assessment evaluates three alternatives: a No Action Alternative, the current action of mechanical and cultural (use materials or techniques that reduce weed populations such as bottom barriers or water drawdowns) control only, and the preferred alternative that utilizes mechanical, cultural, and chemical control in an integrated weed management approach (IWM). The IWM approach will help minimize the use of each option to minimize the potential impacts of each option to fish, wildlife, water quality, and habitat. Cultural and mechanical control will continue to be used in select areas while herbicide applications could occur in suitable sites such as the West Canal that diverts water to Pond 4. This project will last 5 years (2014-2018). During that time, additional herbicide application could occur in additional sites within Canyon Ferry WMA if management area staff determines their necessity.

2.2 Object of the Proposed Action

The objective for the proposed project is to reduce the potential for spreading EWM to other locations via hunter and angler activities on the Canyon Ferry WMA and water bodies downstream, including Canyon Ferry Reservoir. It is unlikely that control efforts will eradicate EWM from Canyon Ferry WMA, as upstream populations will continue to provide plant propagules, but reductions in overall abundance will benefit native ecosystems as well as make weed suppression easier. Considerable reductions in populations from chemical control could allow land managers to implement less invasive measures such as manual and cultural controls throughout the management area.

2.3 Authorities and Relevant Documents

2.3.1 Authorities

MDFWP manages Canyon Ferry WMA under a Cooperative Agreement (No. R12AC60042) with the U.S. Bureau of Reclamation. As part of that Cooperative Agreement, MDFWP has the responsibility to control noxious weeds on the property. This authority comes from the County Weed Act (MCA 7-22-2101 through 7-22-2154) that places noxious weed control on the responsibility of the landowner.

A Montana Discharge Elimination Permit (MPDES) is required to apply any pesticide in or over waters of the state. This permit is a pesticide discharge permit that allows the recipient to exceed temporarily tolerances established by the Montana Department of Environmental Quality. MDFWP will obtain this permit prior to any herbicide application.

MDFWP will obtain all appropriate stream permitting (e.g. Section 310, 124 permit, etc.) or other applicable permissions before placing any benthic barriers or disturbance of the streambed within the wildlife management area.

2.3.2 Relevant Documents

Under the Canyon Ferry Wildlife Management Area Final Draft Management Plan (Carlsen, T and Northrup, R. 1992), one of the listed objectives on Canyon Ferry WMA is control of noxious weeds. Control strategies will follow Montana's Statewide Strategic Plan for Invasive Plant Management and Resource Protection (MNWSAC, 2011). This plan provides best strategies for monitoring and managing aquatic invasive plants.

2.4 Environmental Assessment Scope

MDFWP and Bureau of Reclamation staff identified the following issues to evaluate within the scope of this EA:

- Fish (including species of concern)
- Wildlife (including species of concern)
  - Migratory Birds
  - Mammals
  - Reptiles and amphibians
  - Mussels & Macroinvertebrates
- Vegetation
- Environmental
  - Water quality
  - Air quality
  - Sediments
  - Wetlands
- Recreation
- Human Health

3 ALTERNATIVES

3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, there would be no continuation of EWM control including manual or cultural controls within Canyon Ferry WMA. Therefore, the feasibility of using herbicides as a part of an IWM approach for controlling EWM in this system would be unknown. The EWM infestation would persist within the Missouri River and Canyon Ferry WMA and could potentially spread to other waterways within Montana. The No Action Alternative is not a viable alternative because Montana statute requires FWP to control weeds within their property boundary. If left unchecked, EWM will expand into new areas of the management area and Canyon Ferry Reservoir and negatively impact recreation, water quality, irrigation, fish and wildlife species, and the habitat upon which they depend.

3.2 Alternative 2: Continue with Manual and Cultural Control

Under this alternative, MDFWP would continue with manual and cultural control of EWM within the Missouri River and Canyon Ferry WMA. Efforts would continue to suppress the current weed infestation.

These methods would continue to be used unless a different management option is more efficient or effective. Increased costs and lower effectiveness for widespread infestations may allow EWM populations to spread within the management area and potentially to other water bodies within Montana including Canyon Ferry Reservoir.

3.2.1 Hand Removal

Hand pulling may be an appropriate manual control method on small infestations. Hand pulling and removal of rooted submersed plants is labor intensive, but can be effective on small populations that are not widely established. After removal, plants are removed from the site and disposed of where they cannot contact water. No specialized equipment is required in water less than three feet, but snorkeling equipment or SCUBA gear is necessary in deeper waters. Sediment type, visibility, and ability to remove the entire plant, including roots, determine success of hand removal methods. Advantages of hand pulling include immediate clearing of the water column with low environmental impact. Disadvantages include high cost, temporary increases in turbidity from the digging process, ease of missing plants due to turbidity issues, low effectiveness for large infestations, and labor and time intensiveness. In addition, fragments from EWM can be produced easily, move to new locations, begin colonizing, and establish a new infestation (WSDE, 2010; USACE, 2011)

3.2.2 Diver-operated Suction Dredge

Diver-operated suction dredging is a manual control technology for invasive aquatic plant removal. During diver dredging operations, divers use venture pump systems (small gold mining dredges) to suction plants and roots from the sediment. The operator mounts the pumps on a vessel and the diver uses their hand or hand held tools to remove plants from sediment. The diver uses the suction hose to vacuum plants to the support vessel where a basket retains the plants while sediment and water discharge back into the water body. This method can be effective depending on sediment conditions, density of aquatic plants, and underwater visibility. Diver-operated suction dredging can effectively control early, low-level infestations. Disadvantages include high cost of control per acre, temporary increases in turbidity from the digging process, and easily missing plants due to turbidity issues. In addition, fragments from EWM can be produced easily, move to new locations, begin colonizing, and establish a new infestation (WSDE, 2010; USACE, 2011).

3.2.3 Bottom Barriers

Bottom barriers can culturally control localized aquatic plant populations through compression and light reduction. Bottom barriers specifically for aquatic weed control typically are manufactured from materials that are heavier than water such as PVC, fiberglass or nylon. Bottom barriers are anchored in place with a variety of options such as pins, sandbags, bricks, PVC pipes weighted with sand or steel rebar, or rock. Larger panels that are installed in water depths greater than 4 feet usually require SCUBA gear for proper installation. Solid fabric barriers often need slits or vents to allow gasses to escape and to prevent billowing. Bottom barriers are usually used to control dense, pioneer infestations of an invasive species or as a maintenance strategy around boat docks and swimming areas.

Bottom barriers are also one of the most expensive methods for aquatic vegetation control if used in a large-scale application. They are cost effective when used in small areas. Because the material and installation costs can be expensive, bottom barriers are generally applied to small areas such as around docks and in swimming areas (WSDE, 2010).

Bottom barriers should be left in place for a minimum of 1 to 2 months to ensure that target plants are controlled, but barriers must be regularly removed and cleaned of silt; otherwise, plants may begin to root on top of or through the barriers. Removal, cleaning and re-deployment is usually required every 1 to 3 years depending on the rate of silt accumulation. Bottom barriers non-selectively control aquatic vegetation and may affect fish and other benthic organisms, which is another reason they are usually used for small, localized areas. In addition, high water flows can easily pick up bottom barriers and move them to new locations, potentially causing flooding risks if caught in culverts, which is a possible risk in the West Canal.

3.2.4 Water Drawdown

Water drawdowns can culturally control a number of invasive submersed species including EWM. This technique is used mostly in the northern U.S. to expose targeted plants to freezing and drying conditions. A principal attraction of a drawdown is that it is typically an inexpensive weed control strategy for lakes and canals with a suitable control structure. Plants that are controlled usually by drawdowns include many submersed species that reproduce primarily through vegetative means such as root structures and vegetative fragmentation.

Drawdown conditions maintained for 6 to 8 weeks will help ensure sufficient exposure to freezing and drying conditions. Excessive snow cover or precipitation can limit the effectiveness of this technique. Drawdowns are timed to begin during the fall months to avoid stranding amphibians, mollusks and other benthic organisms with limited mobility. When properly utilized, drawdowns can be a low-cost or no cost strategy to incorporate into an integrated management program.

A drawdown is not a feasible option in the West Canal. MDFWP staff annually close the head gate of the canal at the Missouri River. In addition, attempts to drain the canal completely have failed. Reductions in flows are possible but complete draining and drying of the canal is impossible. High quantities of groundwater seep into the canal due to the high water table in the area (about 10 feet), which provides flowing water throughout the year. In addition, the reach of the Missouri River where it enters Canyon Ferry Reservoir experiences frequent ice jams in the winter months. These ice jams lead to overland flooding that can introduce water into the canal and prevent complete draining, drying, and freezing of sediments and root systems. A water drawdown option has been eliminated from further evaluation, unless severe drought and decreases in groundwater depths occur.

3.3 Alternative 3 - Preferred Alternative: Utilize Chemical, Manual and Cultural Control

Under this alternative, MDFWP would conduct herbicide applications in the West Canal within Canyon Ferry WMA as part of an integrated weed management approach, as well as continue the use of manual and cultural controls in the Cottonwood Channel and other areas within Canyon Ferry WMA. A combination of two herbicides (Endothall and Triclopyr) would be applied by a licensed aquatic applicator during early summer when EWM is actively growing. Application of the herbicides would occur during a one to three day period beginning in July 2014.

Application of this alternative would occur over the next 5 years (2014-2018). During this time, herbicide applications would occur over multiple years to suppress and manage current EWM populations. As part of the integrated weed management approach, additional techniques such as hand removal, placement of bottom barriers, and diver-operated suction dredges may be used. Treatment will occur during periods in which EWM is actively growing, which typically occurs from June through

September. These techniques should be effective in locations with smaller infestations or in environmentally sensitive areas. Herbicides are effective control methods for larger infestations, such as in the West Canal, where other previously mentioned control options lose efficacy or become cost prohibitive.

3.3.1 Herbicides

Aquatic herbicides are applied as concentrated liquids, granules, or pellets. Liquid herbicide formulations are applied to the entire water column to control the submersed weeds, and granular and pellet products are applied using granular spreaders and target the water column with vegetative growth. Aquatic herbicide applicators calculate the volume of the water to be treated before applying aquatic herbicides to ensure that the appropriate amount of herbicide is used.

Similar to herbicides used in terrestrial system there are contact and systemic herbicides. Contact herbicides are the group of herbicides that result in the rapid injury or death of contacted plant tissues and lack mobility within plant tissues once taken into the plant tissue. Contact herbicides can be used to control temporarily aquatic plants such as EWM. These treatments are often initially effective, but treating large plants with a contact herbicide commonly leads to rapid recovery and re-growth from plant tissues that are not exposed to the herbicide. As a result, systemic products are also utilized to control emergent plants (SCE, 2010).

Systemic herbicides are mobile in plant tissue and move through the plant's water-conducting vessels (xylem) or food-transporting vessels (phloem). Once the herbicide is absorbed into the plant, it can move through one or both of these vessels and throughout the plant tissue to affect all portions of the plant, including underground roots and rhizomes. Systemic herbicides are used for a much smaller plant spectrum, including EWM. Control efforts often utilize a combination of herbicides in the management plan to improve overall control with herbicides (SCE, 2010).

Some types of herbicides that are used to control EWM effectively and examined for use in the Canyon Ferry WMA are listed below. Other chemicals may be used as they become available or as new science shows their safety and effectiveness in control of EWM.

3.3.1.1 Herbicides Selected for West Canal EWM control

3.3.1.1.1 Endothall

Endothall is used primarily to control submersed plants and use rates and methods of application vary substantially. Two forms of endothall are available: dipotassium salt and monoamine salts. The monoamine salts are more toxic to aquatic life, so it is not being considered for further evaluation. Levels above 0.3 grams of active ingredient for monoamine salts is toxic to fishes while it takes >100 grams of active ingredient for the dipotassium salts (WSDE, 2010). This low toxicity for dipotassium salts makes this contact herbicide widely used in the US. For quiescent or slow moving water, there may be approximately 7 days restriction for water uses including animal consumption, but in flowing water treatments such as in the West Canal, there are no restrictions for swimming, fishing, livestock watering, and turf irrigation. The effectiveness of Endothall is not affected by factors such as alkalinity or turbidity of the water.

3.3.1.1.2 Triclopyr

Triclopyr was registered for aquatic use in 2002 and a major use of this herbicide has been for selective control of EWM. Triclopyr does not control desirable native species like rushes (*Juncales* spp. and *Scirpus* spp.), cattails (*Typha* spp.), duckweed (*Lemna* spp.), Flatstem pondweed (*Potamogeton zosteriformis*), coontail (*Ceratophyllum demersum*), Southern naiad (*Najas guadalupensis*), elodea (*Elodea Canadensis*), and most species of algae, including the green algae (*Spirogyra* spp., *Cladophora* spp., *Mougeotia* spp. *Volvox* spp., *Closterium* spp. and *Scenedesmus* spp.), *Chara* spp. and *Anabaena* spp. (Getsingeret et al, 2000; Woodburn et al, 1993; Petty et al, 1998 and Green et al, 1989, Foster et al, 1997, Woodburn, 1988 and Houtman, 1997). There may be some sensitive native plant species that are susceptible to Triclopyr, but normally not at typical application concentration of 2.5ppm or less. Higher concentration levels can affect species such as southern naiad, elodea, and coontail (WSDE, 2004).

Triclopyr is registered as both liquid and granular amine formulations. Triclopyr is approved to be used in non-irrigation canals such as West Canal but not labeled for use in un-impounded rivers such as the Missouri River and associated side channels. To achieve the necessary effective contact time and concentration levels, flow through the ditch will be restricted for 24 to 48 hours and water levels reduced to a minimum. The flow rate will be measured and the area/volume to be treated will be estimated once the water levels have reached the minimum. These calculations will determine the concentration and application time for a metered dose system.

The most likely method of applying Triclopyr and Endothall will be to pump herbicide into the head of the canal using a metered chemical injection system. The herbicides will be applied at the rate/time needed to achieve the necessary contact time. Once the application has been completed, flow rates will be returned to normal, effectively diluting any remaining herbicides.

3.3.1.2 Herbicides Eliminated From Further Evaluation

3.3.1.2.1 Fluridone

Fluridone is a bleaching herbicide that targets a plant-specific enzyme that protects chlorophyll, the green pigment responsible for photosynthesis in plants. Fluridone is the only herbicide registered by the EPA that is labeled only for use in aquatic systems, and it is used primarily to control submersed plants. Fluridone symptoms are unique and highly visible, with the new growth of sensitive plants bleaching or turning white as chlorophyll in the plant is destroyed by sunlight. Susceptible plants will show bleaching symptoms in new shoot growth; however, it is important to note that bleaching symptoms do not always equal control and actual plant death may not occur for months after an initial treatment (SCE, 2010).

Fluridone has been described as both a selective and broad-spectrum herbicide because use rates can vary from 4 to 150 ug a.i./L. Higher rates often provide broad-spectrum control, whereas lower rates effectively control only a few species. The Fluridone label states that target weeds must be exposed to Fluridone for a minimum of 45 days. Required exposure periods will often depend on the plant species, stage of plant growth and treatment timing. During the exposure period, new shoot growth of susceptible plants bleach, which depletes the plant's reserves of carbohydrates needed for growth. This slow death (which may take two or more months) can be beneficial to the environment because plants continue to provide structure for habitat and produce oxygen through photosynthesis. The inhibition of weed growth can also allow native plants to re-grow if they are naturally tolerant of Fluridone, but re-growth is highly dependent on herbicide rate. The extended exposure requirement typically calls for treatment of the entire aquatic system or treatment of a protected lake or reservoir embayment.

Despite the extended herbicide exposure requirements associated with Fluridone treatments, there are no restrictions for potable water use, fishing, or swimming; however, irrigation restrictions are described on the product label. The ability to apply low use rates in the parts per billion range, extended exposure requirements, and slow plant death have allowed Fluridone to be used for numerous whole-lake management treatments throughout the United States targeting invasive plants such as hydrilla and EWM. Both products require that plants be exposed to sufficient concentrations of Fluridone for an appropriate period. As a result, sequential Fluridone treatments, often called "bumps," are usually applied over a period to ensure that an effective concentration of the herbicide is maintained. Fluridone is very flexible and can be used in systems of less than one acre and in systems that exceed several thousand acres. Regardless of the size of the treatment, target plants must be exposed to sufficient concentrations of Fluridone for an appropriate period in order to control the target plant effectively. For the concern of the long control period required (45-90 days) and potentially small window time for treatment, it is not being considered in the preferred alternative but could be considered in the future (SCE,2010).

3.3.1.2.2 Diquat

Diquat dibromide is the common chemical component of this herbicide. Diquat is a quick acting contact herbicide that works by disrupting cell membranes and interfering with photosynthesis (BLM 2005). It is a non-selective herbicide, and it will kill a wide variety of plants on contact. It does not move throughout the plants, so it will only kill the parts of the plant that it contacts. Following treatment, plants will die within a week. Diquat will not be effective in lakes or ponds with muddy water or where plants are covered with silt because it is strongly attracted to silt and clay particles in the water. Therefore, bottom sediments must not be disturbed during treatment. There are no restrictions on swimming or eating fish from water bodies if treated with diquat. Treated water cannot be used for drinking water for one to three days, depending on the concentration used in the treatment, or be used for pet or livestock drinking water for one day following treatment. (WDNR, 2012) Results from a risk assessment indicate there is potential risk to aquatic species including fish and macroinvertebrates, especially endangered species, in a pond or stream sprayed with diquat.(BLM 2005). Diquat was eliminated from further consideration due to potential turbidity issues in the management area, toxicity issues to fish and watering restrictions where wildlife may be ingesting the treated water.

3.3.1.2.3 2, 4-D

2, 4-D has been used for selective control of EWM plants. A liquid amine formulation is used to control emergent and submersed plants and a granular ester formulation is used for submersed weed control. 2,4-D is a widely used herbicide that affects plant cell growth and division. It affects primarily broad-leaf plants. When the treatment occurs, the 2,4-D is absorbed into the plant and moved to the roots, stems, and leaves. Plants begin to die in a few days to a week following treatment, but can take several weeks to decompose. Treatments should be made when plants are actively growing. (WDNRC, 2012) Some native emergent plants including water lilies, spatterdock and bulrush are susceptible to 2, 4–D, so care should be taken to avoid injury to these plants. There is a restriction for use with lactating dairy animals. This management area has lactating deer and moose in the vicinity. For concern of the potential effects of 2,4-D during the lactation period, this chemical is not being considered for further evaluation.

4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 Fisheries

4.1.1 Affected Environment

Canyon Ferry Reservoir and the Missouri River prior to entering the reservoir are home to many different species of fishes. Native species include burbot, longnose dace, longnose sucker, mottled sculpin, mountain whitefish, stonecat, westslope cutthroat trout and white sucker. Intentionally introduced species include brook trout, brown trout, rainbow trout, common carp, fathead minnow, flathead chub, largemouth bass, smallmouth bass, yellow perch. Illegally introduced species include northern pike, Utah chub, and walleye (FWP MFISH, 2014). Although these species occasionally enter the canal, many fish are lost to the system when entering the canal system. Pond 4 experiences minimal connectivity with Canyon Ferry Reservoir, but can see some of these species. Pond 4 experiences high turbidity levels due to abundant carp populations and as such, other species are less abundant. The West Canal, which feeds Pond 4, contains very few fish, but stonecats, carp, suckers, and minnow species are found scattered within the canal.

Threatened, Endangered, and Sensitive Fish Species
The westslope cutthroat trout is one of two cutthroat trout subspecies in Montana. Most genetically pure populations are located in headwater streams. Westslope cutthroat trout are extremely rare in Canyon Ferry Reservoir with data only existing from a single sample collected in the reservoir (MT FWP MFISH data). As such, the likelihood of a westslope cutthroat trout being impacted by the proposed activity is extremely unlikely.

4.1.2 Environmental Consequences of Alternative 1: No Action Alternative
Direct and Indirect Effects
With the No Action Alternative, no control work will occur on EWM. As such, fish habitat will likely continue to degrade within Canyon Ferry WMA, as EWM rapidly displaces native vegetation.

Cumulative Effects
The cumulative effects would likely include expansion of EWM within Canyon Ferry WMA and increased risk of EWM being moved to other locations by human dispersal.

Threatened, Endangered, and Sensitive Fish Species
The No Action Alternative will not actively protect these species. Further declines in populations could occur with loss of native ecosystems with novel ecosystems with the existence of EWM.

4.1.3 Environmental Consequences of Alternative 2
Direct and Indirect Effects
Bottom barriers could interfere with fish spawning if placed over locations where species typically choose to spawn. In addition, the benthic community will likely be impacted in the localized areas of the barriers. Desired vegetation will also be killed alongside invasive species, so dense patches of native plants could be killed leaving bare ground for establishment of desired non-natives further altering fish habitat. However, bottom barriers are typically used in small-scale control efforts due to high costs associated with their use, so any disturbance will likely be localized. Hand removal and diver-operated suction dredges may temporarily affect fisheries due to turbidity issues, as well as disturbance of the habitat.

Cumulative Effects
Removal of EWM will provide sites where native vegetation can increase, creating a more typical environment for native fishes. The irrigation canal, however, is not intended to provide suitable habitat

for aquatic species and mortality of fish and invertebrates is largely due to seasonal flow manipulation of the canal.

Threatened, Endangered, and Sensitive Fish Species
Alternative 2 would not pose additional negative impacts to sensitive fish species within the project area if the spread of EWM were eliminated. Direct and indirect impacts are the same as those discussed above. Though unlikely, some sensitive fish species may temporarily be displaced due to the proposed action, but that displacement would be temporary and the viability of their populations would not be impacted.

4.1.4 Environmental Consequences of Alternative 3
The proposed herbicides in this project are those herbicides that are labeled to be used or will be effective in this environment, have been registered by both the EPA and Montana Department of Agriculture, and have been deemed safe if applicators follow the manufacturer's label during application. The applications will occur once per year and exposure times will be short (less than 24 hours).

Direct and Indirect Effects
Endothall
No negative effects have been shown to survival, growth, or reproduction of some warm water fishes including bluegill and largemouth bass over a two-year period when exposed to dipotassium salt of endothall. Rainbow trout is one of the most sensitive fish species in the project area. Empirical tests show that the there is no impact to this species with endothall levels below 5mg a.i./L (maximum-labeled rate). Even when endothall is used at a high rate of 3.5 mg a.i./L no impact to fish are expected (WSDE, 2001).

Triclopyr
Most fish species are not sensitive to Triclopyr at application rates. Sensitive species such as various salmon species have demonstrated LC50's (Concentration that is lethal to 50% of the population) between 96 and 182 mg a.i./L (WSDE, 2010). Rainbow trout species have an LC50 of 117 mg a.i./L (toxicity rating of practically non-toxic), and bluegill, which are commonly used to test toxicity to warm water fishes have an LC50 of 148 mg a.i./L (toxicity rating practically nontoxic) (WSDE, 2004). Risk assessments indicate that triclopyr may be used safely at concentrations up to 2.5 mg a.i./L (maximum labeled rate) when most species of fish and invertebrates are present (WSDE, 2010). The 96-hour LC50 for all verified studies on fish is greater than 82 mg a.i./L. This level is equivalent to a risk quotient for the most sensitive species (rainbow trout) of 0.03. This is below acute levels of concern (0.1) (WSDE, 2010) A study has shown that death of fish that occur during the use of triclopyr is low (<11%) and likely linked to reductions in oxygen levels due to rapid growth of native plant species (Petty et al, 1998)

The applicators will strictly adhere to all herbicide's labels and manufacturer's recommendations. In addition, exposure times will be short and repeat applications are not expected. Therefore, fish within the project area would not be impacted directly by the proposed herbicide applications. Maximum label rates are 5 mg/L endothall, and 2.5 mg/L Triclopyr but lower rates are expected to be used since lower levels should kill EWM plants and meet project objectives while reducing potential risks to non-target plant species and fish species and wildlife. As the treatment will occur in flowing water systems, herbicide dissipation will be rapid lasting a few hours to days. Dilution will occur once the chemical enters Pond 4. In addition, flows could be increased temporarily to expedite dissipation after the treatment is complete. This dilution and dissipation will help return herbicide levels back down to levels within the water quality standards. All these factors will reduce the risk to fisheries and will not pose any considerable risk.

When plants begin to decompose after herbicide treatments there is often a drop in dissolved oxygen levels. These reductions can be fatal to fish species in situations with little water exchange. The moving water through the West Canal will increase dissolved oxygen. Changes in other nutrients may occur during plant decomposition, but these temporary impacts will be quickly diluted and levels will stabilize with fresh water upstream and the additional large volume of water in Pond 4 where the canal ends.

Cumulative Effects
Endothall is unlikely to pose a risk of bioaccumulation in fish and as applications typically occur annually the risk of bioaccumulation is further reduced (WSDE, 2010). Post treatment surveys of EWM by MDFWP staff performed both 6 weeks after treatment and one year after treatment will determine the effectiveness of this treatment option and the potential for it to be used in the future. Successful control of EWM will help improve the overall fisheries in the Canyon Ferry WMA.

Threatened, Endangered, and Sensitive Fish Species
The proposed action would not pose additional impacts to sensitive fish species within the project area. Direct and indirect impacts are the same as those discussed above. The proposed action would have no net effect on threatened or endangered fish within the project area. Though unlikely, some sensitive fish species may temporarily be displaced due to the proposed action, but that displacement would be temporary and the viability of their populations would not be impacted.

4.2 Wildlife
4.2.1 Affected Environment
The primary goal of Canyon Ferry WMA is to provide productive habitat for the diversity of wildlife species that utilize the area and provide for consumptive and non-consumptive use of those resources (Carlsen, T. and Northrup, R., 1992).

<u>Migratory Birds</u>
Canyon Ferry WMA is used by migratory birds as well as resident birds that use the area year round. A total of 197 bird species have been observed on the Canyon Ferry WMA (Martinka 2005). The water resources on this management area are vital for the reproductive and migratory success of many of the species of birds found on the management area. Four artificial ponds where constructed in the 1970's to enhance waterfowl production and reduce air quality problems due to wind-caused dust storms near the Canyon Ferry delta, and these ponds provide valuable nesting habitat. The ponds are relatively turbid due to carp activity, and aquatic vegetation (including EWM) is limited. The management area also supports wild populations of ring-necked pheasant, Hungarian partridge, and turkeys.

<u>Mammals</u>
A wide variety of mammals are found on the management area including large mammals such as moose, white-tailed deer, mule deer, antelope, coyotes, occasional black bears and mountain lions. Smaller mammals include bobcat, fox, raccoons, beaver, skunks, rabbits, and rodents.

Reptiles and amphibians
Common reptile and amphibians found within Canyon Ferry WMA include the painted turtle, bullsnake, common garter snake, western toad, and leopard frog (Flath, D. 1984). There are no known species of concern with the management area.

Mussels & Macroinvertebrates
Macroinvertebrates found within the project area would be those species typically found in a ditch or small, slow moving water body. A spring snail is a species of concern within the management area, but it is found in a spring outside the project area.

Threatened, Endangered, or Sensitive Species of Concern
The Montana Natural Heritage Program tracks the distributions and sightings of federally and state listed species of concern. Information provided from them identified 11 animal species of concern. These species include Clark's grebe, American white pelican, great blue heron, bald eagle, long-billed curlew, Caspian tern, common tern, Clark's nutcracker, veery, bobolink, and a spring snail. All of these species are avian species with the exception of the spring snail that is only found in springs outside of the project area. Most of these bird species also utilize aquatic environments for foraging, breeding, or migratory habitat. This list of species includes a mile buffer from the project area to ensure no other species of concern in the area may utilize the project area.

4.2.2 Environmental Consequences of Alternative 1: No Action Alternative
The No Action Alternative will not actively manage EWM. It is likely that EWM will continue to spread in acreage and in density. This will likely have cascading effects on native plant communities, which will likely affect many different animals that rely on those native plant communities. Some species may benefit from the increase in EWM if they are able to exploit it for food or shelter, while other species abundance may diminish. These unknown cascading effects could also extend into surrounding terrestrial ecosystems since aquatic ecosystems provide resources to other ecosystems.

Threatened, Endangered, or Sensitive Species of Concern
No specific differences exist between species of concern and other species potentially using the project area. Some species may benefit from the increase in EWM if they are able to exploit it for food or shelter, while other species abundance may diminish. These unknown cascading effects could also extend into surrounding terrestrial ecosystems since aquatic ecosystems provide resources to other ecosystems.

4.2.3 Environmental Consequences of Alternative 2
Direct and Indirect Effects
Waterfowl and some migratory birds will likely be slightly impacted by hand removal or diver-operated dredges if they were utilizing EWM while foraging. This will force these species to locate new forage areas within the project area. This relocation should not be difficult as there are many side channels in the project area capable of supporting native plant communities.

Hand removal or use of diver-operated dredges for control of EWM will likely disturb benthic organisms to some extent. Some macroinvertebrates will also be removed from the system with the plant material. As manual methods are slow and labor-intensive, only small areas will be controlled in this manner, so the aquatic organisms will not be greatly impacted. It is expected that any reduction will be short-lived with macroinvertebrates quickly colonizing new plant growth in the area.

Bottom barriers will likely cause benthic community reductions directly under barrier placement locations. Studies have shown 69 - 90% reductions in invertebrates in those areas where barriers were placed (Engel, 1990; Ussery et al, 1997). As these methods are cost prohibitive, only small sections of EWM infestations could be controlled at a time, so surrounding benthic communities would likely quickly re-colonize and recover.

Other animals utilizing aquatic ecosystems may experience short-term negative impacts from hand removal or diver-operated suction dredges with increased turbidity, or loss of forage or breeding habitat. This turbidity will dissipate rapidly in areas that experience high levels of water-exchange.

Cumulative Effects
Due to the relationships that exist between different species within the food web, any large-scale impact or displacement may cause cascading effects into other trophic levels. It is unlikely that displacement of any of these animals will cause large-scale ecosystem collapses, but localized reductions in diversity or abundance is possible.

Threatened, Endangered, or Sensitive Animal Species
With Alternative 2, it is likely that there will be no major direct, indirect, or cumulative effects to any of the species of concerns within this project area. All impacts will be similar to the above effects with slight temporary effects.

4.2.4 Environmental Consequences of Alternative 3
Direct and Indirect Effects
Studies show low toxicity to endothall to *Daphnia magna*, a common test species, when maximum application rate is applied. No adverse impacts have been seen to Cladocerans, Copepoda, and Calanoida. In addition, no adverse direct effects or indirect effects, like reductions in dissolved oxygen, have been noted in free-swimming species. Benthic invertebrates display similar characteristics with low acute toxicity (WSDE, 2010). Application of Endothall at the label rates will not adversely affect any macroinvertebrates.

Studies show that triclopyr and its associated chemicals after breakdown are non-toxic to aquatic invertebrates (e.g. *Daphnia magna*, crayfish, benthic community) and likely do not pose chronic risks since the half-life is short (<5 days) and the chemicals quickly disappear from the water column. Higher concentrations around the maximum-labeled rate (2.5 mg a.i/L) present a low to moderate risk. Field trials in control of EWM, purple loosestrife, or water hyacinth show no invertebrate mortality or changes in populations that could be attributed to Triclopyr use. (Petty et al, 1998, Green et al, 1989and Gardner and Grue, 1996, Houtman et al, 1997, Fosteret all, 1997 Woodburn, 1988).

Little is known on the effects of Triclopyr to amphibians, but it is anticipated that amphibians would be affected by Triclopyr similar to fish species. As such, there is likely no adverse from the herbicides at the suggested application rates (WSDE, 2004).

Avian/birds toxicity studies indicate that triclopyr and its products used as aquatic herbicides do not pose an acute or chronic risk to wild birds (WSDE, 2010). Mallard Ducks have an LC50 of 50mg a.i./L for endothall, which is nearly ten times the maximum-labeled rate (WSDE, 2001).

Wildlife could be exposed to chemicals through treated water they use as drinking water or eating aquatic organisms exposed to the chemicals. Based on acute and chronic studies the proposed chemicals do not pose any significant risks. (WSDE, 2010; WSDE, 2004) Exposure risk is minimal due to the short exposure time, fresh water exchange from upstream, and dissipation into Pond 4. In addition, there is a low tendency for bioaccumulation for either herbicide (WDSE, 2010; WSDE, 2004).

Threatened, Endangered, or Sensitive Species
The proposed action may pose short-term impacts to threatened, endangered, and sensitive wildlife species within the project area. The direct and indirect impacts are the same as those discussed above.

Cumulative Effects
It is expected that control of EWM would improve aquatic habitat and improve biodiversity. Recreationists will continue using the area with lower risk of spreading EWM to other areas. Cumulative effects of the proposal are unlikely to be significant.

4.3 Native Vegetation

4.3.1 Affected Environment

Within the project area where the treatment will occur, typical native aquatic plants are found as well as riparian plants along the water's edge. Grasses dominate the edge of the West Canal. There are no plant species of concern in the project area.

4.3.2 Environmental Consequences of Alternative 1: No Action Alternative

Under the No Action Alternative, it is likely that EWM will continue to spread in acreage and in density. This will likely have cascading effects on native aquatic plant communities. Eurasian watermilfoil may utilize habitat typically occupied by native aquatic plant species, which could result in system scale reductions in the native plant community.

4.3.3 Environmental Consequences of Alternative 2

Direct and indirect effects
Under alternative 2, manual and cultural control will work to reduce EWM levels. Bottom barriers will non-selectively kill plants lying under the fabric. Water drawdowns will indiscriminately kill native and nonnative species. Hand pulling and diver operated suction dredging will more selectively remove EWM while leaving native species. However, turbidity caused during removal makes missing individual plants very likely, and these two techniques are only effective in small areas. As a result, it is likely not all the EWM would be removed.

Cumulative effects
As plants will likely be missed, EWM would persist and spread into new areas or reestablish in treated areas. This will cause additional impacts to the native plant communities within Canyon Ferry WMA and downstream into Canyon Ferry and the Missouri River system.

4.3.4 Environmental Consequences of Alternative 3

Direct and indirect effects

Triclopyr does not control desirable native species like rushes (*Juncales* spp. and *Scirpus* spp.), cattails (*Typha* spp.), duckweed (*Lemna* spp.), Flatstem pondweed (*Potamogeton zosteriformis*), coontail (*Ceratophyllum demersum*), Southern naiad (*Najas guadalupensis*), elodea (*Elodea Canadensis*), and most species of algae, including the green algae (*Spirogyra* spp., *Cladophora* spp., *Mougeotia* spp. *Volvox* spp., *Closterium* spp. and *Scenedesmus* spp.), *Chara* spp. and *Anabaena* spp. (Getsingeret et al, 2000; Woodburn et al, 1993; Petty et al, 1998 and Green et al, 1989, Foster et al, 1997, Woodburn, 1988 and Houtman, 1997). There may be some sensitive native plant species that are susceptible to Triclopyr, but normally not at typical application concentration of 2.5ppm or less. Higher concentration levels can affect species such as southern naiad, elodea, and coontail (WSDE, 2004).

Endothall is a non-selective contact herbicide so some native plant species may be impacted when exposed to higher levels of Endothall. Endothall will only kill parts of plants exposed to the chemical so only the stems and leaves of plants would be killed with endothall. So short-term damage to native plant species within the canal could be seen but should be short lived, and plants should recover in subsequent seasons. However, within the area that is being treated with herbicide, very few native plants exist because the EWM covers most of the suitable substrate for plant growth. The dilution that occurs when the water from the canal enters the pond will reduce chemical levels in the pond to levels that will not affect plant communities.

Cumulative effects

Alternative 3 will lead to large-scale reductions in EWM. This will allow native plants to colonize exposed substrates. Though some EWM will likely reestablish from upstream sources, native plants will also, so the overall impact from EWM will be reduced.

4.4 Water Quality

4.4.1 Affected Environment

The proposed action includes waters within Canyon Ferry WMA, which includes the Missouri River and associated side channels and backwaters before it dumps into Canyon Ferry Reservoir. In addition, several canals feed water to four wildlife ponds adjacent to the south end of Canyon Ferry Reservoir. The only proposed location for an herbicide application is within the West Canal that feeds Pond 4. The canal does not serve as a water source for irrigation. Neither the West Canal nor Pond 4 is used for drinking water or livestock though wildlife such as deer and moose may use it as a water source. Other activities such as hand pulling, bottom barriers, and diver-operated suction dredging could occur in other locations including side channels of the Missouri River. This area experiences seasonal river levels that peak in mid-summer.

4.4.2 Environmental Consequences of Alternative 1: No Action Alternative

Direct or Indirect Effects

Under the No Action Alternative, EWM infestations would persist and likely spread. No chemicals would be used so the associated risks with those would be eliminated. However, water quality could degrade through dissolved oxygen depletion due to decomposition of large EWM beds.

Cumulative Effects

Under the No Action Alternative, EWM infestations would persist and potentially spread into other areas of the project area or even into Canyon Ferry Reservoir. This spread could lead to additional localized dissolved oxygen depletion.

4.4.3 Environmental Consequences of Alternative 2

Direct and Indirect Effects

The most likely impacts of Alternative 2 would include temporary increases in water turbidity and potential reductions in dissolved oxygen levels. Hand pulling, and diver-operated dredges will temporarily increase turbidity as the location of the activity. Increases in nutrients or reductions in dissolved oxygen would not be likely since the plant material is removed from the water. Bottom barriers will not cause major increases in turbidity but may cause localized reductions in dissolved oxygen levels due to decomposition of plants trapped beneath the barrier. Dissolved oxygen levels will be near zero beneath the barrier, so impacts to the benthic community are likely (Ussery et al, 1997). In addition, increases in phosphorus may occur with plant decomposition. This could temporarily increase phytoplankton growth. The potential for adverse impacts is limited to localized areas, since these methods would only occur at a small, localized scale.

Cumulative Effects

Large infestations of EWM, such as in the West Canal, will not be effectively suppressed increasing the potential for eventual large-scale die-offs of EWM, leading to dramatic drops in dissolved oxygen when the die-offs occur. This could severely affect aquatic ecosystems within Pond 4.

4.4.4 Environmental Consequences of Alternative 3

Direct and Indirect Effects

The direct and indirect effects resulting from Alternative 3 only include short-term impacts. All chemical applications will follow all label restrictions and application rates specified by the manufacturer. As recommended rates will exceed water quality standards, a Montana Discharge Elimination Permit will be obtained prior to application.

Endothall is stable in pure water, at a pH of 7 has a half-life potential of 2,285 days, and does not go through hydrolysis or photolysis. However, microorganisms play the major role in endothall breakdown. The half-life of endothall in a typical field application, in which microorganisms would be present, is one day to about eight days. Endothall total persistence time is typically 30 to 60 days. High water temperatures decrease total persistence time. As this chemical breaks down quickly, and has a short half-life, water quality standards will only be exceeded for a short time.

Spot treatments typically use concentrations of Triclopyr near the maximum-labeled rates. Studies have shown that those sites see a drop in Triclopyr concentration to drinking water tolerances (0.5 mg a.i./L) generally within one day but could take eight days in areas with low water exchange. Chemical compounds associated with Triclopyr are typically lower (0.1 mg a.i/L) on the application day and dissipate to undetectable levels about three days afterwards (WSDE, 2004) The rapid dissipation to levels below drinking water tolerances indicate that this herbicide will have only short-term effects. In moving water systems, such as in the West Canal, dissipation times will likely be quicker.

Cumulative Effects
Exposure of living plant tissue to herbicides usually results in secondary effects that may affect the biota. When plants start to die, there is often a drop in the dissolved oxygen content associated with the decay of the dead and dying plant material. Reduction in dissolved oxygen concentration may result in aquatic animal mortality or a shift in the dominant form or diversity of biota (WSDE, 2004; WDSE). There may also be changes in the levels of plant nutrients due to release of phosphate from the decaying plant tissue and anoxic hypolimnion. In addition, ammonia production, from the decay of dead and dying plant tissue, may reach levels toxic to the resident biota. Ammonia may be further oxidized to nitrite, which is also toxic to fish. The presence of these nutrients may cause an algal bloom to occur (WDSE 2010). In order to mitigate for these potential negative cumulative impacts, application will occur as early in the season as possible to target plants when they are actively growing but biomass levels have not reached maximum levels (i.e. plants are not topped out in the water column). Input of fresh water and dilution into Pond 4 will also reduce potential build up of toxic chemicals or depletion of dissolved oxygen helping to mitigate any potential negative cumulative effects.

4.5 Air Quality

4.5.1 Affected Environment

The state of Montana, as well as the Federal EPA, has established standards regarding several air quality contaminants including carbon monoxide, lead, hydrogen sulfide, sulfur dioxide, particulate matter smaller than 10 microns, particulate matter smaller than 2.5 microns, ozone, and nitrogen dioxide. The nearest air quality station is located in Lewis and Clark County, north of Canyon Ferry WMA. The station measures carbon monoxide, ozone, sulfur dioxide, and particulate matter, which measurements are all below the set standards.

4.5.2 Environmental Consequences of Alternative 1: No Action Alternative

Direct and Indirect Effects
Under the No Action Alternative, no control efforts would occur for EWM, and consequently there would be no direct or indirect effects to the air quality in the area.

Cumulative Effects
Under the No Action Alternative, no control efforts would occur for EWM, and consequently there would be no cumulative effects to the air quality in the area.

4.5.3 Environmental Consequences of Alternative 2

Direct and Indirect Effects
Suction dredging would have a minimal effect on air quality because of the use of combustion engines. As such, direct and indirect effects on air quality are not considered significant.

Cumulative Effects
Operation of a diver-operated suction dredge would likely only occur during a few days each year, so the cumulative effects of the operation would not be considered significant.

4.5.4 Environmental Consequences of Alternative 3

Direct and Indirect Effects
Herbicide application used for EWM control is not expected to appreciably effect air quality because of the small size of the areas treated, the amount of herbicide used, the mode of application (injection or

granular compared to boom or aerial applications), and the rapid dilution of herbicides in the air. As such, effects on air quality are not considered significant.

Cumulative Effects
Application would only occur once to several times a year on a small number of acres so cumulative effects are likely not significant on air quality. No local area tolerances of air pollution are expected to be exceeded.

4.6 Sediments

4.6.1 Affected Environment

The areas that will be controlled for EWM are aquatic; therefore, the sediments play a large role in aquatic ecosystem. There is a range of sediment types, which are determined by water velocity in the area. Sediment types in aquatic environments include cobble, gravel, sand, or silt.

4.6.2 Environmental Consequences of Alternative 1: No Action Alternative

Direct and Indirect Effects
Under the No Action Alternative, no control of EWM would occur so no changes in the sediment will occur.

Cumulative Effects
Under the No Action Alternative, no control of EWM would occur so no changes in the sediment will occur. Increased sedimentation due to establishment of dense EWM and reductions in water velocity could change the benthic community with potential cascading effects to aquatic and terrestrial ecosystems.

4.6.3 Environmental Consequences of Alternative 2

Direct and Indirect Effects
Hand removal and diver-operated suction dredges require disturbance of the sediments, though only in small areas. This small-scale disturbance will not likely have any adverse effects on sediments.

Cumulative Effects
Removal of EWM may increase velocities in some sites, which will facilitate scouring silts and consequently may improve or create habitat for sensitive cutthroat species. These changes will be highly localized so the impacts may not be clearly noticeable.

4.6.4 Environmental Consequences of Alternative 3

The environmental fate of herbicides in sediments may play a role in its potential risk to fish, wildlife, and human health. The chemicals in the preferred alternative are selected because of their short half-lives, and their inability to adsorb to soils. As a result, these chemicals should not pose a risk resulting in the maintenance of high quality sediment for the benthic community.

Endothall half-lives in aerobic soils with viable microbial populations ranged from less than one week to approximately 30 days (WSDE, 2010). In two field tests, residues were non-detectable after 21 days. In lacking sufficient microbial populations able to degrade endothall, two studies found a half-life of 166 days and persistence of residues over 0.05 mg a.i./L more than one year (WSDE, 2010). It is likely that the West Canal and Pond 4 contain sufficient microbes to accelerate the degradation process. Due to high water solubility and low soil/water distribution coefficient, dipotassium endothall does not adsorb well to most soils (WSDE, 2010).

Triclopyr persistence studies in sediments showed the half- life of triclopyr in the sediment ranged from around one day to six days, and the half-life of triclopyr metabolites were approximately eleven days (WSDE, 2004). Triclopyr does not readily adsorb to soils (WSDE, 2004). The low levels of triclopyr in sediment indicate that the sediment quality should remain high in treated water bodies and that such sediments should pose little or no threat to benthic in-fauna (WSDE, 2004).

4.7 Wetlands

4.7.1 Affected Environment

The project area is a river delta of the Missouri River as it enters Canyon Ferry Reservoir. In addition, water canals feed several wildlife ponds on the Canyon Ferry WMA. Within the project area there is a mosaic of wetland communities including palustrine, lacustrine, and riverine wetlands. The majority of the West Canal exists outside of any wetland complexes until it nears Pond 4 where it passes through some palustrine wetlands dominated by riparian forests, shrubs, and emergent sites. Most of the areas around the Missouri River and its associated wetlands are a mosaic of wetland types ranging from palustrine, lacustrine, and riverine wetlands. The four wildlife ponds typically have palustrine wetlands dominated by shrub and emergent type wetlands though some lacustrine sites may exist in the deeper portions of the ponds.

4.7.2 Alternative 1: No Action Alternative

Under the No Action Alternative, no direct or indirect effects should occur to wetlands in the project area nor should there be a net change in wetland acreage. However, the quality of deeper water wetlands may decrease as biodiversity decreases with increases in EWM populations.

4.7.3 Environmental Consequences of Alternative 2

Direct and Indirect Effects

Bottom barriers will effectively remove vegetation with the potential 100% control of plants. As such, there is risk to wetlands with standing water during control efforts. Though bottom barriers are non-selective, their small-scale use allows some selectivity of species by allowing the manager to avoid critical habitat where EWM is not present. The sites where bottom barriers are installed will likely see 2-3 years of control, though colonization is largely influenced by the rate of propagules introduction.

Hand-pulling and diver-operated suction dredges will not adversely affect wetlands, as EWM plants can be selectively removed, while leaving native plant species. Rapid increases occur in turbidity at the work site because of control efforts, so target species are missed easily. This difficulty in spotting target species reduces the overall efficacy of hand pulling and diver-operated suction dredges.

Cumulative Effects

There are no cumulative effects from utilizing manual and cultural control methods.

4.7.4 Environmental Consequences of Alternative 3

Direct and Indirect Effects

Because of the manner in which herbicide products are applied, impacts to other wetland environments are unlikely. There may be some flow of water into estuarine, palustrine, riparian, lentic, or lotic environments. However, it is not anticipated that the impact would be measurable due to dilution effects since the treated water quickly dilutes as it flows from the West Canal into Pond 4. The total application of these products should not exceed 2.5 mg a.i./L for the treatment area per annual growing season. Most emergent plants are not likely to be adversely affected at the concentrations of triclopyr used to control aquatic weeds. (WSDE, 2004)

Cumulative Effects
A study comparing the efficacy of bottom barriers versus herbicide applications to control EWM showed that one-year post-treatment, EWM populations in the bottom barrier treated area returned while native plants did not. While the area treated with a systemic herbicide showed little growth of EWM and excellent colonization of native plants (Helsel et al, 1996). Control of EWM will help reestablish desired submerged vegetation within wetland and open water areas. As the chemicals will quickly dissipate, there should be no further cumulative effects from active ingredients affecting the native community.

4.8 Recreation

4.8.1. Affected Environment

Canyon Ferry WMA is a sought out location for recreationists to view wildlife, hike, camp, fish, and hunt upland birds, waterfowl, and big game species. As such, it is important to control invasive plants such as EWM. While in the process of controlling those species, it is important to prevent impacts to recreation as little as possible.

4.8.2 Environmental Consequences of Alternative 1: No Action Alternative

Direct and Indirect Effects
Under the No Action Alternative, there will be no efforts to suppress or control EWM. As such, recreation opportunities could be adversely impacted with decreases in biodiversity, difficulty in navigating watercraft through dense weed patches, loss of fishing opportunities, and loss of desired aesthetics due to EWM expansion in the surrounding water system.

Cumulative Effects
Increases in EWM infestations will result in decreases in recreation opportunities. These reductions in opportunities may have impacts to the local economy through loss of tourism, or increased costs of having to travel further to find the same recreational opportunities.

4.8.3 Environmental Consequences of Alternative 2

Direct and Indirect Effects
Bottom barrier use on high boat traffic areas is expected to improve boating activities. Weighted materials used to keep barriers down will be made of natural material such as rocks or burlap sandbags, or from manmade material such as weighted PVC pipe to prevent injury to recreationists or equipment. Gases produced from decomposing plants can cause billowing of the bottom barrier. This billowing can lift the barrier off the bottom posing a navigational risk, so some slits in the fabric may be required to allow escapement of gases.

Hand removal or diver operated suction dredges will likely improve boating and recreation activities in areas of heavy vegetation. Some short-term impacts will be caused by turbidity and some closures of small areas will occur during control efforts to protect the diver in the water.

Cumulative Effects
Manual and cultural control efforts will help continue to provide the best recreation possible to the people of Montana. Efforts will potentially improve recreation opportunities and provide valuable economic benefits to the state and local community.

4.8.4 Environmental Consequences of Alternative 3
Direct and Indirect Effects
The preferred alternative will help improve the overall recreation opportunities within Canyon Ferry WMA. Control of EWM will help prevent spread of the invasive species without closing the area to recreationists, which will maintain or enhance recreational opportunity. Some short-term closures in select areas of the project area, such as in the West Canal during chemical application, will occur to protect recreationists. These closures will be less than a day and will not prevent recreationists from using the rest of the management area.

Cumulative Effects
Alternative 3 will help continue to provide the best recreation possible to the people of Montana. Efforts will maintain or enhance recreational opportunities and provide economic benefits to the state and local community.

4.9 Human Health
4.9.1 Affected Environment
Potential pathways for affecting human health include direct herbicide contact to herbicide applicators and direct herbicide contact, inhalation, or ingestion from members of the public that could potentially swim within or drink from treated areas shortly after application. The proposed herbicides quickly become diluted and quickly biodegrade; therefore, the opportunity for the public to be exposed to the herbicide is limited. The project area is a wildlife management area, so there are no sources of drinking water or wells within the project area.

4.9.2 Environmental Consequences of Alternative 1: No Action Alternative
Direct and Indirect Effects
With the No Action Alternative, no herbicide treatment or weed control activities would occur so there would be no direct or indirect effects to human health.

Cumulative Effects
The No Action Alternative would not result in changes to current human health conditions and therefore there would be no cumulative effects to human health.

4.9.3 Environmental Consequences of Alternative 2
Direct and Indirect Effects
With Alternative 2, manual and cultural weed control activities would not incur any human health risks.

Cumulative Effects
With Alternative 2, manual and cultural weed control activities would not cause changes in any human health conditions, so there are no potential cumulative effects.

4.9.4 Environmental Consequences of Alternative 3

Direct and Indirect Effects

The chemicals to be used in Alternative 3 are approved by the EPA and registered in the State of Montana. These herbicides are water-soluble and readily eliminated by humans so they do not pose a risk of bioaccumulation. The short half-lives of the selected herbicides also reduce potential intake by humans. Research has shown little or no acute risk to human health if used within the manufacturer's specification through all possible exposure vectors (WSDE, 2010). Chronic exposure assessments indicate human health should not be adversely impacted from chronic exposure to these chemicals via ingestion of fish, ingestion of surface water, incidental ingestion of sediments, dermal contact with sediments, or dermal contact with water (swimming) (SCE, 2010). The proposed herbicides have been chosen for their sensitivity to human health and the environment.

Triclopyr

The greatest risk is posed to the applicator. All personal protection equipment required by the chemical label will be used to reduce the potential exposure of applicators to the chemicals. Exposure of the public to herbicides at harmful levels is not likely. Eye irritation or over exposure could occur if swimming in Triclopyr-treated water. Risk analyses were completed for various populations. The most sensitive population was found to be children who swim for three hours and ingest water while swimming. However, a child would have to ingest 3.5 gallons of lake water where triclopyr had been recently applied to cause risk factors to be exceeded. Based on the label use directions and the results of the triclopyr toxicology studies, the aggregate or combined daily exposure to the chemical from aquatic herbicidal weed control does not pose an adverse health concern (WSDE, 2004). In an effort to prevent any potential exposure, treatment areas will be posted prior to application, and the public will be made aware of applications prior to their occurring. Swimming will not be allowed in treated areas for 12 hours per the manufacturer label.

Concentration of Triclopyr will quickly fall below the drinking water tolerance generally in one day though it could be up to 3 days (Houtman et al, 1997) and Triclopyr metabolites typically are not detected on the same day of application (WSDE, 2004)

Endothall

Repeated daily or weekly chemical exposures for short time frames typically occur during the application of a chemical or through dietary intake of a treated food crop or water. Most human chemical exposures are either acute (one time exposure) or sub chronic (exposure to a chemical for a few days or weeks). The potential for sub chronic exposure to endothall would also occur when the chemical is used for aquatic weed control. Such exposures for persons in contact with recently treated water would primarily involve dermal contact with the chemical through swimming, ingesting the water or sediment, or dermal contact with treated sediments and aquatic weeds. (WDSE)

The results of the exposure and risk assessment indicate that a person could swim daily in the treated water and never reach the lowest No Observable Effect Level (NOEL) endothall dose of 2.6 mg/kg/day. As a result, aquatic application of endothall-containing products in compliance with label directions is not expected to result in adverse health effects following contact with treated water. Further, factors mitigating against any adverse health effects from applied endothall are the high water dilution rate, poor dermal and gut absorption, rapid excretion of absorbed endothall and short half-life in water, all of which support the conclusion that overexposure to the chemical is unlikely (WDSE). An exposure assessment to evaluate swimmers' exposure to endothall treated water was conducted according to EPA's standard operating procedures for swimmer exposure in treated water, which calculated that the daily total dose to a person swimming in water containing 5 mg a.i./L endothall was extremely low and did not present an acute toxicity risk (Lunchick, 1994)

Cumulative Effects
The human health cumulative effects associated with the aquatic herbicides used in the proposed action are not expected to result in adverse health effects, if chemicals are utilized properly according to label directions, which they will be. The treatment area will only have one treatment per year and the actual area is quite small. Rapid dilution will reduce potential chronic exposure time.

5 ENVIRONMENTAL ASSESSMENT PREPARATION

5.1 Environmental Impact Statement Determination

After considering the potential impacts of Alternatives 2 and 3 and planned mitigation measures to reduce predicted impacts to the physical and human environment, MDFWP has determined that an Environmental Impact Statement is not warranted. The anticipated negative affects to fisheries, vegetation, and the public would be minimized through the season of implementation, public education, appropriate application of herbicide, and natural process of the waterways.

5.2 Document Preparers

Fred Jakubowski, MDFWP Fish and Wildlife Technician, Townsend MT
Craig McLane, MDFWP Aquatic Invasive Species Specialist, Helena MT
Ron Spoon, MDFWP Fisheries Biologist, Townsend MT

5.3 Contributing Agencies, Organizations or Groups

U.S. Bureau of Reclamation, Canyon Ferry Field Office, Helena MT

6 PUBLIC PARTICIPATION

6.1 Public involvement

The public will be notified in the following manners to comment on this current EA, the proposed action and alternatives:

- Two public notices in each of these papers: Helena Independent Record and Bozeman Chronicle
- Public notice on the Fish, Wildlife & Parks web page: *http://fwp.mt.gov*.

Copies of this environmental assessment will be distributed to the neighboring landowners and interested parties to ensure their knowledge of the proposed project.

6.2 Duration of comment period:

The public comment period will extend for (30) thirty days beginning July 28, 2014. Written comments will be accepted until 5:00 p.m., August 27, 2014 and can be mailed or emailed to the address below:

Craig McLane
Montana Fish, Wildlife & Parks
1400 East 8th Street
Helena, MT 59620
cmclane@mt.gov

(406) 444-1224

7 REFERENCES

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